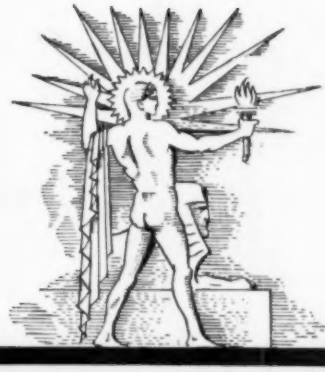
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



July 20, 1940

Fire Fighter

See Page 36

A SCIENCE SERVICE PUBLICATION

Do You Know?

A Mexican firm plans to make a product similar to Bakelite from a *cactus*.

Ancient Rome observed rigid and deliberate ceremonies before declaring *war*.

Glaring headlights may blind a driver or pedestrian as long as three seconds, tests show.

Young *mallard ducks* can swim a third of a mile when they first leave the nest, Michigan conservationists state.

Salt or vinegar will not *set colors* in cotton goods prepared with the modern dyes, says an extension clothing specialist.

Why a robin has to tug for an *earthworm:* the worm's body has nearly 1,000 hook-like bristles that can grip the earth.

A new Swedish method of impregnating timber with *arsenic* is believed satisfactory for making spruce wood resistant to decay and insects.

Recent *hearing tests* indicate that about one person in 25 has trouble hearing in an auditorium, and one in 400 has difficulty over the telephone.

A *relief map* of the United States 32 by 20 feet, completed by WPA workers, is called the largest accurate three-dimensional map of the country.

Giving suitable intelligence tests to *Australian natives,* a psychologist found some much brighter than others, and the brightest with apparently high intelligence.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

AERONAUTICS
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PUBLIC HEALTH
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ZOOLOGY
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Rubber furniture, manufactured from latex, is reported as new.

A *skyscraper* built in 1930 required about 25% less steel than one of the same size built in 1912.

About one person in 18 is badly poisoned by ordinary contact with *poison ivy,* and resistance seems to run in families, says a botanist.

By ingenious practice equipment, German *parachute* soldiers are taught within a few feet of ground to jump and land as though from great height.

Japan is producing *glycerine* from hardened sardine oil.

There are nearly 55,000 licensed *amateur radio* operators in this country.

A type of European *corn borer* now spreading in New York State produces two broods a season instead of one.

The Southwest Museum has an Indian basket with three *dromedaries* woven into its design—a relic of the attempt of U. S. government officials to introduce these desert beasts into the Southwest nearly a century ago.

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MEDICINE

Develop New Cancer Serum That May Aid Diagnosis

Serum Is Prepared From Blood of Rabbits Injected With Aluminum Cream Containing Cancer Tissue

A SERUM that may aid diagnosis of cancer and may even have value for treatment of the malignant disease has been developed by Prof. William H. Welker and Dr. Lawrence S. Mann, of the University of Illinois College of Medicine.

Announcement of the serum is made to the medical profession in the *American Journal of Cancer* (July).

The serum gave positive reactions with the blood of cancer patients in a high percentage of cases. In cancer of the stomach the percentage was 57%. In cancer of the womb the percentage was 87%, or seven positive reactions in eight cases tested.

No cures nor attempt to cure cancer are mentioned in the technical report which describes the preparation of the serum. Prof. Welker, in a communication to Science Service, expressed the hope that the report would not have the "cruel" effect of raising false hopes in laymen who might expect more of the serum than can be guaranteed on the basis of present knowledge about it.

Blood tests with the serum were made by stratifying diluted human blood serum, from either normal persons or cancer patients, over the rabbit cancer anti-serum. A white ring developing at the zone of contact after a period of one hour indicated a positive reaction.

The serum is prepared from the blood of rabbits injected with aluminum cream (aluminum hydroxides) containing ground and specially treated cancer tissue. This has the effect of mobilizing in the rabbits' blood the defensive troops called antibodies.

The particular accomplishment in preparation of the serum, which has been attempted many times before, was to cause mobilization of antibodies specifically capable of dealing with the protein of cancer tissue.

The difficulty in the past in preparing such a specific antiserum for cancer protein has been that when cancer cells were injected into rabbits, not only cancer-fighting antibodies but also antibodies for handling foreign blood were mobilized. This was because of the difficulty of separating cancer proteins from the blood proteins. As a result, the reaction of the serum with the blood of cancer patients might be a reaction with the blood and not just with the cancer proteins, if any were present in the blood. Consequently the previously prepared serums could not be used successfully in cancer diagnosis tests. The serum prepared by the Chicago scientists is specific for cancer protein, their tests show. It reacts only with cancer tissue or with the blood of cancer patients. It does not react with the normal tissues nor the blood from normal patients.

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POWERFUL

The tiny U-shaped piece is a new magnetic alloy developed at the Bell Telephone Laboratories, which is composed of vanadium, iron and cobalt, which will hold more permanent magnetism than any other commercial material. It can be machined, drawn and rolled. It is heat treated to develop its magnetic qualities, making it possible to weld pole pieces to the magnet and heat-treat both together.

MEDICINE

Anti-Poison Ivy Cream Made By U. S. Public Health Service

A VANISHING cream that gives protection against poison ivy has been developed by Dr. Louis Schwartz, Dr. Leon H. Warren and Frederick H. Goldman of the U. S. Public Health Service and the National Institute of Health. The formula for the cream, which is made by mixing either sodium perborate or potassium periodate with vanishing cream, will appear in a forthcoming issue of the *Public Health Reports*.

Tests on nine volunteers showed that the cream protects against both the poison ivy extract, which is at least 30 times as powerful as any poison ivy leaf, and against the leaves and stems of the plant itself. Two of the nine volunteers, one the most susceptible and one medium susceptible to poison ivy, after rubbing on the cream, went out into the fields near the National Institute of Health at Bethesda, Md., and pulled out poison ivy plants by the roots, plucked the leaves, and rubbed them over their skins. Neither volunteer suffered any ivy poisoning from this.

Dr. Schwartz and associates have no doubt the cream will be equally successful in protecting others against poison ivy if it is made and used according to directions.

It must be rubbed all over the face, hands, arms or any other part of the body likely to come in contact with poison ivy. After four hours, when the worker stops for lunch, it should be washed off with soap and water. Then after lunch, before going out into the fields or woods again, the cream should again be thoroughly applied all over the exposed skin, and again washed off at the end of the afternoon.

The reason for washing it off and reapplying it at the end of four hours is to make sure the skin is all covered and so protected against the poison ivy. Some of the cream is likely to rub off by the end of four hours and especially during the lunch hour.

In making the cream, and any drug-

gist can do so, 10% sodium perborate is used, or 2% potassium periodate. These two substances come in crystals which should be ground into powder first because the crystals will not mix well with the cream. The vanishing cream should be made first and then the chemical added, otherwise the chemical will react with other ingredients of the vanishing cream and the result will not be satisfactory. The cream should be freshly prepared at least once in two weeks to avoid deterioration.

The cream acts by filling the pores of the skin and forming a protective covering which prevents much of the ivy poison from penetrating the skin.

As perspiration comes in contact with the vanishing cream in the pores of the skin a soap is formed and in addition to washing the poison ivy off and out of the skin, the alkalinity of the soap liberates nascent oxygen from either the sodium perborate or the potassium periodate. This oxygen neutralizes the ivy poison. Tests made by Dr. Schwartz and associates showed that an alkali alone will not neutralize the ivy poison.

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FORESTRY

Forest Service Prepares For Worst Fire Season in Years

Conditions Worse Than Since 1934; Fire Fighters Experimenting With Parachutists Dropped on Fires

See Front Cover

THE U. S. Forest Service is preparing for the worst forest fire season in recent years.

Losses are not heavy so far because serious fires now raging in Oregon and Washington are mostly in logging slash and are outside the national forests. High, drying winds prevailing throughout the western part of the country during June, however, have made conditions favorable for fires to do terrific damage if they should happen to get started. The season is just about a month advanced by weather conditions.

Logging operations have been stopped in the area along the Columbia River below Portland, enforcing a law designed to reduce the fire hazard. It is not thought by experts that this action will affect the Government's defense plans. Although spruce was used extensively in airplanes ordered by the French, planes for American use depend more on metal. It is not known yet in Washington whether the area in which logging has been stopped is a spruce-bearing region, but it is not thought likely. Spruce usually grow in moister areas where fire danger is not so great.

This year, when fire conditions are worse than they have been for six years, the U. S. Forest Service is experimenting with new devices which, it is hoped, will greatly speed up the fighting of fires before they get beyond control.

Parachute troops, dressed in fire-resistant, padded suits are being trained to drop down on the fires from airplanes. With them is dropped food, fire-fighting equipment, and a portable radio. This radio, weighing only six pounds including antenna and batteries, enables the fire fighter to report back to headquarters within eight and a half minutes after he drops.

Parachutists are being taught to land in trees. This is not considered ideal for actual fire fighting. But since it might be necessary under some conditions, the men are being taught how. And they like it—call it a feather-bed landing. They carry a specially contrived rope device for letting them down from their perch and they are now able to get down in from eight to ten minutes.

Accuracy of "aim" has been perfected so that it is much greater than has ever been achieved with chemical dropped on a fire. First a ten-pound weight is dropped so that the wind drift can be observed. Then the parachutist takes off, using a special technique for leaving the plane so that he lands in an upright position that will avoid injury. Equipment is dropped separately on burlap parachutes.

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The drumming of the *ruffed grouse* was supposedly due to the bird's wings beating its body or a log, until motion pictures showed that the bird drums by fanning the air.

PSYCHOLOGY

Frustrated Forest Folk Set Fires for Excitement

MILES of forest fire running free in the South every year, destroying great treasures of woods and wildlife, are a burning signal of dangerous impoverishment in the lives of hundreds of thousands of American people.

Nine out of ten of these great, hazardous forest fires of the Southland are set by human hands, most of them deliberately.

The fire-setters would tell you that they burn the woods to kill snakes, to keep down the ticks, to destroy boll weevils. But the answer lies much deeper, it is revealed by a sociological - psychological study of the men and women in a typical forest-fire region just conducted for the U. S. Forest Service by Dr. John P. Shea.

The lives of these people are boresome. Families of as many as eleven persons live in three-room unpainted cabins, and their family income is about $12 a month. They go undernourished and poorly clothed.

Psychologically, they are just as impoverished. Their education is equivalent to only third or fourth grade. Exhaustion of game and fish deprived them of their two main recreations. Music, even fiddling, is conspicuous by its absence. Only a few do basket weaving.

They whittle. They talk. And they just "set."

Living constantly on the verge of dangerous frustration, they crave the excitement of fire with all the unusual activity of those who try to put it out.

Remedies urged by Dr. Shea in the current *American Forests* include: Securing the cooperation of a few "Pappies" in a locality, make it possible for them to build a community center suitable for movies and dances. Supply it with soft pine sticks for whittling, also with cuspidors.

Provide simple games and contests such as horseshoe pitching and a shooting range. Organize 4-H clubs and local fish and game organizations. Let them feel that all these activities as well as any educational demonstrations are their own and not imposed on them by any external agency.

These Americans are willing to get their excitement in less destructive ways in they are available, and the forest fires may be looked upon as their unconscious signal for aid.

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GENERAL SCIENCE

Breakdown of Cooperation Most Damaging Effect of War

Even in United States Voluntary Control Over Scientific Publication Is Being Put Into Effect

THE BREAKDOWN of international cooperation in science is one of the most damaging by-products of the war. Up until the very eve of hostilities, international congresses of scientists were being held, in some cases with scientists from totalitarian countries in attendance, particularly if the science being discussed did not conflict too much with the ideologies of the dictators.

Now, as Hitler's armed forces have inundated neutral and belligerent countries alike, extinction of fruitful centers of research has occurred or is in progress. In some cases, as in Poland, apparatus and books have been carried off to Berlin as loot. The staffs of scientific laboratories have been dissipated or have suffered worse fates. The seed of scientific progress is being crushed mercilessly.

In all parts of the world, science is becoming more nationalistic and secretive. With armed might being used ruthlessly, scientists are rushing to the defense of their threatened countries. Longtime projects are being pushed aside to help military preparations. Ideas for military use, scorned as wasteful in more peaceful days, are being revived and nurtured.

Here in our own country there is being put into effect a voluntary control over scientific publication for fear that information may be given "to the enemy." For example, it is very improbable that if significant advances are made in the release of atomic energy from uranium, details will be made public under present conditions. It will become a military secret.

Even in the war upon disease in which all inhabitants of the earth should be allies, war between men interposes its barriers. Here in America has been developed an immunization against typhus fever, louse-borne disease prevalent in eastern Europe. Vaccine for experimental use has been sent to Hungary and Rumania, but it is proving difficult to pass new supplies and reports on results through the military lines of Germany and Italy.

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LIGHTNING RECORD

The disks in the background of this instrument being demonstrated by Charles F. Wagner of Westinghouse bear magnetic records of lightning. From these records, precise pictures of lightning may be drawn.

PHYSICS

Find Quantity of Electricity In Single Lightning Bolt

A SINGLE bolt of lightning, crashing from cloud to earth for about a fiftieth of a second, may contain a quantity of electricity sufficient to operate a hundred watt lamp for nearly three minutes. This has been learned from studies made with a new device, the "magnetic surge integrator," which Charles F. Wagner, consulting transmission engineer for the Westinghouse Electric and Manufacturing Company, described at the meeting of the American Institute of Electrical Engineers in Swampscott, Mass. He also told of two other devices which he and an associate, Gilbert D. McCann, have devised in order to answer about lightning strokes the questions, "when, how, how fast and how much."

The "fulchronograph", which tells "when and how," consists essentially of an aluminum disc a foot in diameter, around the edge of which are inserted 400 small steel fins, each about half the size of a nail file. Every 1/25,000 second a fin passes through a narrow coil, where the lightning surge magnetizes it. The disc is returned to the laboratory after operation, and the amount of magnetization of each fin is measured. From these data the buildup of the electrical wave is determined.

The magnetic surge integrator is somewhat similar, but is designed to magnetize the strips continually through the duration of the stroke, so they carry a record of the total amount of electricity. The third device, the "magnetic surge front recorder," answers "how fast?" Four coils, connected in parallel with the wires over which the surge is coming, magnetize two small strips of steel. The amount they are magnetized is dependent on the change in current in the coils, so the maximum lightning current may be found.

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BIOLOGY—PHYSICS

Plant Virus Demonstrated With Electron Microscope

VIRUS diseases of plants, like tobacco mosaic, that produce colorless patches in the leaves, do so by direct attack upon the green chlorophyll particles. This has been demonstrated in photographs made with the electron microscope at the Siemens-Halske laboratory in Berlin by Drs. G. A. Kausche and H. Ruska.

The pictures, at 19,000 diameters, show the characteristic rod-shaped giant molecules of the virus in intimate contact with chlorophyll granules. These molecules are not visible in electron pictures made of preparations from healthy leaves.

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Droning airplanes spoiled so many movie "takes" that Hollywood producers now send a *balloon barrage* aloft to show planes where sound stages are.

PSYCHOLOGY

Uncle Sam Is Streamlining, Mechanizing Civil Service

Punch Card System With Mechanical Sorting Speeds Transfers of Employees to Jobs Essential to Defense

UNCLE SAM is streamlining and mechanizing his Civil Service to fit in with the rush of national defense plans.

Government offices expanding to meet defense demands will not have to wait for the preparation of "eligible registers" in the old way. New agencies will not have to wait for the holding of new examinations. Employees out of jobs because of curtailed, non-defense activities will not have to hunt in the old way for their own new jobs.

Punch cards and machine sorters and tabulators like those used for the Census make it possible to locate in record time all the persons now in Government service who are qualified for any job where need is urgent.

Every employee in the Government service is being asked to furnish the Civil Service Commission with detailed information about his experience, qualifications and even his hobbies.

He will tell whether he is licensed to practice law, whether he is a public accountant, airplane pilot, architect, or veterinarian; whether he can run an addressograph, mimeograph, photostat or telegraph.

For probably the first time, Uncle Sam will lend an attentive ear while the employee tells of his hobbies. He is actually encouraged to tell about his photography and his short-wave radio, about his Sunday lessons in flying and his summer mountain-climbing. But, despite the great hobbyist in the White House, the directions specifically state that he refrain from telling that he collects stamps or does knitting.

All these details will be translated at the Civil Service Commission into the code of holes in the punch card. Then when the Army needs a flock of electrical engineers, or the Navy needs draftsmen, the electric fingers of the sorting machine can easily pick out qualified employees where they are located in those offices that can afford to spare men for transfer.

Personnel records can then be pulled out for study, individuals interviewed, and transfers to other jobs expedited.

Eventually, perhaps, this mechanized placement system devised to meet the urgencies of a mechanized defense will be expanded to make the selection of new employees for the Government Service simpler and more efficient.

Practically every applicant for a Civil Service job must take a general intelligence or IQ test, known as a general adaptability. About three different grades of this test, for different levels of intelligence would most likely serve for all of the thousands of jobs offered under Civil Service.

Suppose a girl takes an examination today for file clerk. She takes the adaptability test and also takes some special tests designed to measure her special fitness for the job of filing.

Her scores on these tests, together with information about her previous experience and training, can be punched on one of the new personnel cards.

Next year, perhaps, she applies for a job as typist. Under the new plan as it will probably be developed, she need not take another adaptability test. Her ability on that sort of thing is already a matter of record. All she would have to do is to appear for a typing test, and her new score on the typing would go right on the same card with her record as a good file clerk.

Time and money would be saved for both applicant and the Government. And the appointing officer would be able to locate this girl without searching two or more eligible registers.

But that sort of plan is for the future. Uncle Sam is concentrating right now on speeding up his defense program. And there are plenty of well qualified men and women right in the Government service if they can be transferred from non-essential activities to the places where the need is greatest.

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IDENTIFICATION

Radio Operators May Be Fingerprinted By Government

IF YOU are a radio "ham" and operate your own transmitter, you may have to register your fingerprints along with those of aliens at your post office.

The Post Office Department has been requested to take the fingerprints of all radio operators at the same time that they register aliens. As yet they have not accepted the invitation.

The alien fingerprinting, which is to start on August 28, will be done in post offices and possibly also in schools or other places. It is expected that standard fingerprint cards for all ten fingers will be used, such as those already in use for criminals by the Federal Bureau of Identification. Aliens' prints probably will go right into the regular files of the FBI.

The details of the plan have not, however, been definitely settled as yet. Probably black ink like printer's ink will be used.

Although the post offices are already taking fingerprints in connection with their postal savings accounts in some 690 of the largest offices, it is not anticipated that the post office fingerprinting system will be used in registering aliens. For postal savings only the first three fingers of the right hand are printed. A stainless system developed about 20 years ago by the National Bureau of Standards is used instead of the rather messy ink. The applicant dips his fingers in a paste of lead soap and ferric chloride to make the prints which are then developed in sodium sulfide and sodium carbonate.

Fingerprints are also used for identification purposes by the Civil Service Commission, which fingerprints all Government employees under Civil Service. The Army, the Navy, Coast Guard, Marine Corps and the Veterans Administration identify their personnel by fingerprinting.

All applications for the soldier's bonus were required to be accompanied by the prints of the five fingers of the right hand of applicant. These were checked with the prints in the files of the Army. Then at settlement, the fingerprints were taken again to insure that the right person collected the money.

The U. S. State Department uses fingerprints in an unusual way. Passports for use of Americans in Europe these days must bear a fingerprint, but it is not the fingerprint of the person holding the passport. It is the imprint of the thumb of an official in the U. S. State Department, and it is assurance that the passport is genuine.

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MEDICINE

Hormone Bank Treatment Gives "Miraculous" Results

Synthetic Chemical Buried Under Skin Relieves Case Of Muscular Weakness, Effect Lasting for Months

"CLOSE TO MIRACULOUS" results from the hormone bank treatment of the chronic progressive disease of muscular weakness, myasthenia gravis, are reported by Dr. Robert C. Moehlig, of Detroit. (*Journal, American Medical Association,* July 13)

The treatment consisted in burying under the patient's skin little pills of desoxycorticosterone acetate, a synthetic chemical believed to be the same as the cortical hormone produced by adrenal glands.

The pills or pellets of this substance act like a bank of the hormone material on which the body can draw for its daily needs. This treatment with the synthetic adrenal hormone chemical was first used for patients suffering from another ailment, Addison's disease, which is an adrenal gland disorder.

The case Dr. Moehlig reported was that of a 32-year-old physician. Like other sufferers from myasthenia gravis, this patient got out of breath, weak and tired on the slightest exertion. The history he wrote of his own case states that he "could hardly raise his arms to shave or comb his hair. The weight of the head and shoulders and the effort to hold himself upright seemed intolerable."

He had trouble in swallowing and talking, and felt "utterly exhausted" and quite drowsy most of the time.

Injections of the synthetic hormone chemical definitely relieved the weakness and fatigue, starting five hours after the injection. The effect, however, was only temporary, so it was decided to give the patient a more lasting supply by implanting pellets of the chemical to create a hormone bank.

"The effect of the pellet implantations has been close to miraculous in its sustained and complete relief of symptoms," Dr. Moehlig states.

No symptoms of the disease were noticeable three and one-half months after the pellet implantation. The supply implanted last October was calculated to last 450 days.

"Naturally," Dr. Moehlig cautions, "further experiences with other patients as well as the continued progress of this patient are desirable before final conclusions concerning lasting benefits are made."

Dr. Moehlig gives several reasons for trying the Addison's disease treatment in the case of myasthenia gravis. For one thing, loss of strength and fatigue are in a general way outstanding symptoms of both conditions, although in myasthenia gravis the tiredness comes only when the muscles affected by the disease are called on for sustained effort. The patient's past history, furthermore, indicated muscular weakness and a congenital predisposition to disturbance of muscle metabolism, and both the pituitary gland and the cortex of the adrenal glands are concerned with muscle metabolism.

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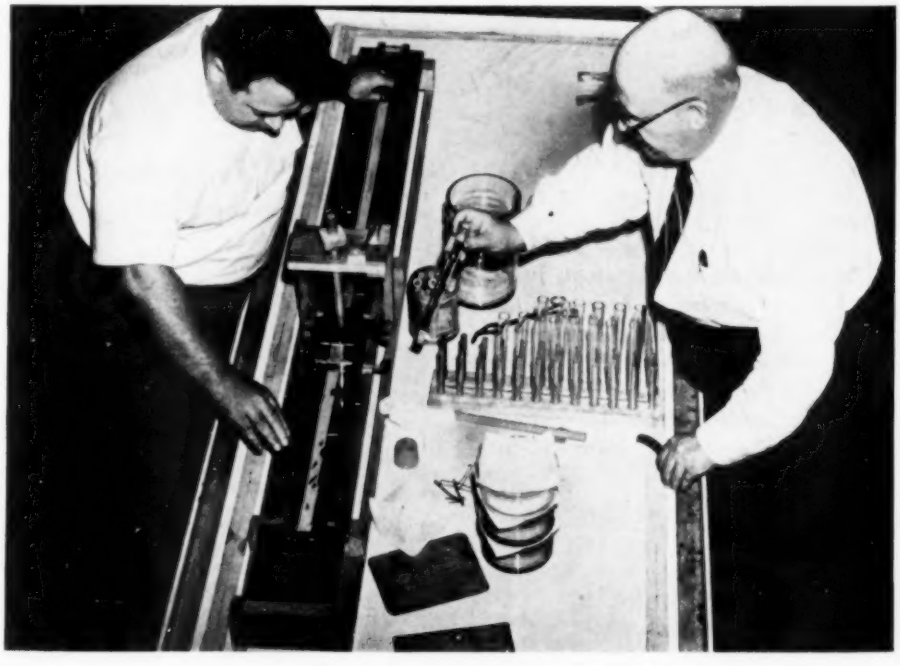

AIR CONDITIONING FOR INSECTS

Because insect pest will not breed readily when the temperature is too high or too low, special air conditioning equipment devised by the General Electric Company has been installed at the New Jersey State Experiment Station, New Brunswick, N. J., to assure a supply for study. A temperature of 72 degrees is maintained in winter and 75 degrees in summer, while the humidity is kept at 73 per cent., just right for roaches. Dr. T. J. Headlee, head of the entomology department of the station, is shown above (right) with an assistant, studying some of the insects produced under these ideal conditions.

Glue made of potato flour is a German wartime product.

The explosive power of *gasoline,* fire chiefs were recently told, is 83 times that of dynamite.

● RADIO

Dr. C. Hawley Cartwright, of the Massachusetts Institute of Technology, will describe "Invisible Glass" as guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Thursday, July 25, 4:00 p.m., EDST, 3:00 EST, 2:00 CST, 1:00 MST, 12:00 PST.

Listen in on your local station. Listen in each Thursday.

MEDICINE

Pneumonia Serum Acts By Medical "Blitzkrieg"

PNEUMONIA - CURING antiserum stops the spread of the disease in the lungs by a medical "blitzkrieg" invasion of the areas involved, Dr. W. Barry Wood, Jr., of Harvard Medical School, reports. (*Science*, July 5)

The serum contains antibodies, substances antagonistic to the pneumonia germs. After the serum has been injected into the vein in sufficient quantities, the antibodies, Dr. Wood has discovered, invade the pneumonia lesion in the lung and stop its spread by their antagonistic action on the pneumonia germs.

His tests, made on rats with experimental pneumonia, refute the previously held view that the antibodies of pneumonia serum could not penetrate areas of consolidation within the lung.

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MEDICINE

Surgical Lessons Learned From War Experiences

ONE of the most important and lasting results of war since ancient times has been the gain in knowledge of how to heal broken bones and torn flesh. It is too early to say whether victims of automobile and industrial accidents in future will be helped by the lessons surgeons learn from the present war, but a look at the past, even so recent a past as the war in Spain, suggests that this may be so.

"Experience gained in war has always been a factor in surgical progress," Dr. J. Trueta, late director of the department of surgery, General Hospital of Catalonia, Barcelona, points out in his just published book for surgeons, *Treatment of War Wounds and Fractures*.

The use of living maggots to clean up infected wounds, now widely practiced in modified form, was introduced by an American surgeon, the late Dr. William Baer, after his experiences as an army surgeon during the World War. But another, earlier army surgeon, Ambroise Pare, first advocated this method in the sixteenth century, Dr. Trueta states.

To another army surgeon, Pierre Percy, who studied bullet wounds, Dr. Trueta says modern surgeons owe "the first appreciation of the difference between wounds of entry and of exit, and of the characteristics of the wound track."

A method of treating war wounds, and their peacetime counterparts in automobile and industrial accidents, which was born out of the World War, proved its value in the Spanish war, in Dr. Trueta's opinion. He reports 1,073 cases treated by this method with only six deaths. The method, developed by an American surgeon, Dr. Winnett Orr, is known as the closed method of treatment of wounds of the limbs in which there is both a broken bone and torn flesh.

Science News Letter, July 20, 1940

ZOOLOGY

Rabbit-Sized Antelopes Headed for National Zoo

WITH a 700-pound pigmy hippopotamus as star of the passenger list, a rare and distinguished gathering of West African jungle animals is taking ship in Liberia, scheduled to arrive at Norfolk, Virginia, about July 20. Obtained by Dr. William M. Mann, director of the National Zoological Park at Washington, the collection will show America some species of Liberia's wild life seldom seen outside that country.

Included in the collection, which was obtained with aid of hundreds of natives, are antelopes no bigger than rabbits, rare crocodiles, big and little parrots, and several crates of monkeys.

Science News Letter, July 20, 1940

PUBLIC HEALTH

First Case In Oklahoma Of Relapsing Fever

A CASE of relapsing fever, serious tropical disease rarely seen in the United States, is reported by Dr. W. P. Neilson, of Enid, Oklahoma. (*Journal, American Medical Association*, July 13)

The case is the first ever reported in Oklahoma. How the patient got it is something of a mystery. The disease is caused by the kind of germ known as a spirochete and is generally transmitted to man by the bite of an infected louse or tick.

Dr. Neilson's patient, however, did not remember being bitten by any insect and did not show any signs on her skin of such a bite. She lives on a farm, but does no outside farm work where she might be bitten by ticks, and there are no rats or other rodents around to harbor the germs. She had not been away from her immediate vicinity and no foreign guest has visited the home.

She was cured of the ailment by the chemical, neoarsphenamine.

Science News Letter, July 20, 1940

IN SCIEN

PLANT PATHOLOGY

Chemical Found Effective Against Tobacco Disease

PARADICHLORBENZENE, a chemical now widely used in combating insect pests, has been found effective in preventing downy mildew, one of the worst diseases of tobacco, in a cooperative research project conducted by the Virginia Agricultural Experiment Station and Duke University.

PDB, as the compound is called for short, is introduced as a vapor over the seedbeds, which are covered with cotton sheeting to keep the vapor down during the period of fumigation. The odorous gas penetrates into the leaf tissues and kills the deadly fungus threads that are attacking them. At the concentrations used, the chemical is harmless to the young tobacco plants.

Associated in the research were J. A. Pinckard, Ruth McLean, F. R. Darkis, P. M. Gross and F. A. Wolf. Results will be published in full in the forthcoming issue of the technical periodical, *Phytopathology*.

Science News Letter, July 20, 1940

ANTHROPOLOGY

Europe's War Strikes Home To Indians—No More Beads

AMERICAN Indians face a bead shortage, the result of the European war.

Czechoslovakia, for years regarded by the Indian Service as the only satisfactory source of tiny beads used in Indian craftwork, has ceased sending bead imports, Commissioner of Indian Affairs John Collier has learned. A limited supply of these beads is on hand in this country.

Other beads on the market, including those from Italy and those made in this country, have never come up to Indian requirements, the Indian Service points out. Beads for Indian belts, purses, moccasins and other craft wares must be of even size, with smooth edges that will not cut the thread, an eye large enough to be easily threaded, and the beads themselves must be durable. Best Czechoslovakian beads for this purpose are of porcelain.

Science News Letter, July 20, 1940

NE FIELDS

PLANT PHYSIOLOGY

Plants Are Stimulated By Vitamin Treatments

TWO vitamins, already proved necessary for human health, are now shown in experiments to stimulate the growth of plants. One of the B vitamins, riboflavin, made eggplant grow faster and bigger, while ascorbic acid, or synthetic vitamin C, caused unusual gains in tobacco growth.

In the experiments reported by Dr. Raymond Dennison of the State University of Iowa (*Science,* July 5) the plants were grown in gravel and fed by nutrient solutions. When the vitamins were added increased growth was obtained.

Eggplants receiving riboflavin developed double-length stems with triple-weight tops. The leaves of the vitamin-treated plants were consistently coarser in texture, thicker and darker in color than those of the untreated plants. Tobacco leaf was more than doubled by the vitamin C additions.

These experiments recall the widespread use of vitamin B_1, or thiamin chloride, for treating plants, and the controversy as to whether this vitamin really aids plant growth.

Science News Letter, July 20, 1940

PHYSICS—MEDICINE

Gift of $200,000 Will Provide Cyclotron

CONSTRUCTION of a cyclotron, device for obtaining high energy particles of matter used in atom study, but in this case primarily for medical use, will begin soon at the University of Pennsylvania.

Dr. Thomas S. Gates, president of the university, has announced a gift of $200,000 from William H. Donner, retired industrialist, for the purpose. Three years ago Mr. Donner gave the University a similar amount to establish a department of radiology, in memory of his son.

In treating cancer, it is stated, two techniques will be used. In one, various chemicals will be subjected to the rays from the cyclotron and so made radioactive. Then they can be administered to the patient. In the second method, the patient will be directly subjected to a stream of neutrons, obtained by bombarding a plate of the metal beryllium. Because of the few facilities for medical use of a cyclotron now available, this possibility has only been slightly explored, and will, at the beginning, engage the principal attention of the University's scientists.

The new cyclotron will weigh 250 tons, and will equal the largest now in operation, at the University of California. With its completion, the University of Pennsylvania will become the first university in the world to have the two chief tools of atom smashing. A 5,000,000 volt electrostatic generator was installed last year by the department of physics.

Science News Letter, July 20, 1940

GEOLOGY

Greenland's Cliffs Made By Geological Revolution

GREENLAND'S towering cliffs, possible factors in strategy in later phases of this war, were prepared many ages ago by a geological revolution deep within the body of the earth, according to a hypothesis proposed in the science journal, *Nature,* by Prof. L. R. Wager of the University of Reading. (*Nature,* June 15)

The great and abrupt lift of the land and the depression of the adjacent Denmark strait, Prof. Wager suggests, were caused by a downward flow of the deepest parts of the rock material involved. Above it, an intermediate layer also flowed, becoming greatly thickened in one place and lifting the mass that has since become Greenland. Alongside this area it became correspondingly thinned, permitting the subsidence that is now the strait.

At the "hinge" between land and sea, the layers nearer the surface cracked under the strain, and the plastic magma from deep within flowed up, to form a swarm of wall-like "dykes" that have long been a puzzle to geologists who have studied Greenland's structure.

The total uplift, through the ages, amounted to more than ten miles, Prof. Wager calculates. Of course, the island never actually became that high, for erosion was constantly at work on the top as the mass was pushed up from the bottom. The present plateau of Greenland, which is still very high, represents today's balance between uplift and erosion.

Science News Letter, July 20, 1940

MEDICINE

Knock-Out Blow to Chin May Produce Brain Anemia

THE UNCONSCIOUSNESS that follows a knock-out punch to the chin or a blow elsewhere on the head may possibly be due to a short-lasting but complete brain anemia, Dr. W. W. Scott of Chicago, believes as a result of studies on changes in pressure within the cranium produced by blows on the head.

The "punch-drunk" state, Dr. Scott further suggests, may result from damage to the brain and nervous tissue caused by repeated short-lasting brain anemias produced by blows on the head. The anemic brain condition cuts off oxygen supply to the brain and this is known to produce serious damage to the brain tissue.

Because Dr. Scott's studies are of interest to physicians treating brain concussion caused by blows received in accidents as well as in the prize ring, the editor of the *Journal of the American Medical Association* calls attention to them in the issue for July 6. The studies were originally reported to the technical journal, *Archives of Neurology and Psychiatry.*

Science News Letter, July 20, 1940

AERONAUTICS

Diesel Airplane Engines Get Oxygen at Takeoff

STIMULATION of diesel airplane engines with oxygen just at takeoff may make possible widespread future use of such safer and more economical engines, Prof. Paul H. Schweitzer of Pennsylvania State College predicted following recent experiments.

Feeding oxygen into the intake air of a diesel engine increases its power output by 55% for a few minutes without undue strain, the tests showed. Airplanes usually require about a third more power for takeoff than for ordinary flight. Prof. Schweitzer suggested that oxygen boosting for takeoff might overcome the diesel's handicap of somewhat greater weight per horsepower when compared with gasoline engines. Diesels with lower fuel consumption and less fire danger have been used in many German and some American planes.

A 3000 horsepower transport plane would need about 160 pounds of liquid oxygen, costing less than $50, to supply an additional 1000 horsepower for two minutes required for takeoff.

Science News Letter, July 20, 1940

PSYCHIATRY

Electric Shock, a New Treatment

Shot Directly Through Brain, Electricity Now Used To Restore Patients With "Hopeless" Mental Disease

By MARJORIE VAN DE WATER

AN ELECTRIC shock, shot directly through the brain, provides new hope for bringing patients back from the living death of mental disease to mental health.

Coming at a time when war is subjecting the population of the whole world to those intolerable mental strains that precipitate mental disease, this new use of electricity for mental health instead of for death is being enthusiastically welcomed by the medical profession.

I saw this new, dramatic shock treatment tried at the New York State Psychiatric Institute. Introducing it to American physicians is Dr. Lothar Kalinowsky, who has already administered it in Rome, where the treatment originated, in Paris and in London. He stood at the switch to treat two American boys. Dr. Kalinowsky is now working at the Psychiatric Institute with Dr. S. E. Barrera.

One of these two young men, chosen to be first to receive the electric shock treatment here, has seemed doomed to a chronic mental illness, schizophrenia. He has failed to respond to any other known treatment.

The other has had periods of improvement, always followed by relapses. He is diagnosed by psychiatrists as suffering from obsessional neurosis with depression.

I cannot tell you the names of these two boys because now it is hoped that they may get well again. We can call them Johnny and Jack.

No Electric Chair

There was no "electric chair," no shaving of the head. The current does not pass through the whole body, only through the brain from one temple to the other. It is this fact, together with the small amount of power used and the very brief time of the shock, that makes the treatment safe. What looks a little like ice tongs or a giant pair of calipers holds, on each tong, a soft rubber pad with four little strips of copper tape. These are the two electrodes. They are adjusted comfortably over the head. The patient has stretched out on a table, familiar to all hospitals.

Then, when preliminary tests had been made, Johnny received his shock. Instantly, when the current was switched on, Johnny became unconscious. He knew nothing more of the treatment. And he will not remember it later.

But what happened at first was an epileptic fit of the mild sort known as petit mal. After he came out of it and regained full consciousness another shock was applied. This time the voltage was stepped up from the first dose of 85 volts to 90 volts. He received 500 milliamperes of current the first time, 750 milliamperes on the second dose. But the electric current was sent through the brain only for one-tenth of a second each time. For that brief time, I was told, a person can stand much higher voltages without any harm, as shown by animal experiments.

Johnny's fit was violent. It took several doctors and nurses to hold him on the table and keep him from hurting himself. But it was all over in just 65 seconds. Then they put him on a bed where he thrashed around for a while and then was quiet. Someone asked him who is running Germany. "A long time ago there was a man named Hitler," he said.

A half hour later I talked with him. He was up walking around, but said he didn't know anything that had happened after the "things" were put on his head.

"Say, Doctor!" he called. "Things are much clearer now! Will it last?"

This is Johnny, the depressed patient. He seems cheerful enough now.

ELECTRIC SHOCK APPARATUS

Dr. Lothar Kalinowsky (left) is here describing to Dr. S. E. Barrera, principal research psychiatrist of the New York Psychiatric Institute, details of the electrical apparatus which they are about to use in treating a mental patient. The complete apparatus is portable and can be carried to ward or even to patient's home for treatment. The pads with criss-crossed copper tape, on the ends of the gadget held by Dr. Kalinowsky, are the electrodes.

STUDIES EYES

As Dr. Kalinowsky adjusts the electrodes for the first electric treatment for mental disease at the New York State Psychiatric Institute, Dr. E. Milch examines with an ophthalmoscope the inside of the patient's eyes. Research of this sort carried on during the electric treatment will also provide physicians with new knowledge about epilepsy, for the electric schock produces an epileptic fit. Dr. Barrera is closely watching the patient.

Treatment of Jack, the "hopeless" sufferer from that most common of all mental diseases, schizophrenia or dementia precox, was very much like that of Johnny except that Jack required only one shock and did not go through the period of restless thrashing around afterwards. After it was all over, he had no knowledge whatever of having had any treatment.

The fit produced by the electric shock is very much like that of the metrazol shock therapy which is now widely used in the United States, especially for schizophrenic patients.

But the great advantage of the electric treatment is that the patients do not remember and dread the shock and resulting fit. There is no period of suspense and fear as there is in using metrazol between injection of the drug and loss of consciousness. After the fit, the patient is never excited or disturbed as he may be after metrazol.

With the electric treatment, the patient is relaxed when the convulsion seizes him and so it is hoped there may be less danger of the patient's hurting himself.

In addition, electricity is always obtainable, is cheap and requires a smaller staff of doctors and nurses than drug shock treatments do.

Finally, when the switch is turned off, the patient is left free of any after effects. No drug is left in the body.

This electrical treatment, now introduced in the United States, was originally developed in Rome under the guidance of Prof. U. Cerletti of the Psychiatric University Clinic.

This use of epileptic fits to battle mental disease is not the first instance where medicine has induced one disease in the hope of destroying another. Even better known is the deliberate production of malaria in the patient with brain syphilis in order to stop the disease-causing spirochetes.

One of the first drugs used to bring on induced epileptic seizures for healing purposes was camphor. Metrazol is now replacing camphor, because it acts more immediately. But like camphor, it is being used reluctantly for the reason that physicians know little about how to bring a patient out of the induced convulsions. And the severity of the convulsions cannot easily be controlled. Sometimes they are very severe indeed, and in the strain of them, patients may even fracture their bones or dislocate joints.

More widely accepted, perhaps, but much more expensive and difficult to administer is the insulin treatment which acts in a similar way to shock the patient back from his world of phantasy to reality and health.

These deliberately-induced shocks are not the first known to cure mental disease. Dr. N. D. C. Lewis, director of the New York Psychiatric Institute, has told me of several surprising cases within his own knowledge that had been accidentally shaken out of their mental fog by a severe shock.

Snake Bite Gives Healing Shock

One case occurred during the time when Dr. Lewis was experimenting with snake venom as a death-producing agent in animals. He had a collection of extremely venomous snakes and kept them in secure cages with a special device for putting in food out of reach of their deadly fangs.

The snakes liked sun. One day while they were sunning outdoors outside the laboratory, a patient, perhaps bent upon suicide, broke out of the line of men taking exercise, rushed to the cage of snakes, tore the top off, and thrust his arm in among the serpents. He was badly bitten.

Within 15 minutes Dr. Lewis was working over him with shock-combatting drugs. But already the patient was mottled from the poison, his eyes were rolled back in his head. He seemed close to death.

But he lived.

And when he recovered, his mental disease was gone.

Presumably it was the shock that made him well. And presumably it is the shock that gives insulin, metrazol and the other drugs of this family their therapeutic effect.

Some physicians are assuming that it is the shock that makes a bolt of electricity through the brain restore mental health. But this is not known definitely. Medical science has much to learn about how these treatments act. Dr. Kalinowsky told me that personally he has doubt that it is the shock that, in the case of electricity, produces the beneficial result.

Just what it is, he is not yet ready to say. Perhaps it destroys diseased brain cells. Perhaps it induces new pathways in the brain over which brain currents may pass. This is for future research to disclose.

In the meantime, it is hoped that the day may come when the man or woman suffering from delusions, abnormal fears, split personality, or a regression into

CONVULSION

This group of physicians watching the first electric treatment for mental disease to be given at the Institute are all needed to hold the patient on the bed as the convulsion wracks his body.

fixed posture and mutism may some day be cured simply in his own home or a local hospital by a physician who places two electrodes on the distressed head and then just plugs in on ordinary house current stepped down to the harmless voltages used.

Science News Letter, July 20, 1940

MEDICINE

Cure for Bubonic Plague Seen in New Chemical

CURE of bubonic plague by chemical remedies of the sulfanilamide group is expected as a result of successful experiments with plague-susceptible mice. The experiments were made by Dr. S. S. Sokhey, director, and Dr. B. B. Dikshit, pharmacologist, of the Haffkine Institute, Bombay, India, and are reported to physicians. (*Lancet,* June 8)

One of these remedies, sulfathiazole, saved 80% and 90% of the plague-stricken mice after the disease had reached the most dangerous stage, when the germs had invaded the blood stream.

Even better curative results are hoped for when sulfathiazole is used to treat humans because the disease is much more severe in mice than in men. Drs. Sokhey and Dikshit hope soon to try it on human cases of plague.

Sulfathiazole proved, in mouse plague, to be more effective than sulfapyridine or other of the sulfanilamide group of chemical remedies. Results of treatment with sulfathiazole are as good as those obtained with the Haffkine Institute anti-plague serum.

Because plague is present in wild rodents in the Pacific Coast area of the United States, the use of sulfanilamide chemicals in combatting this disease may some day be of practical importance in this country.

Science News Letter, July 20, 1940

PHYSIOLOGY

Ability to Make Vitamin C Linked With TB Resistance

Men, Monkeys and Guinea Pigs, Who Must Get Their Vitamin C From Diet, Are All Susceptible to TB

ABILITY to manufacture anti-scurvy vitamin C in the body and ability to resist invasion of the tuberculosis germ are apparently linked in some as yet unexplained way.

The relationship is pointed out by Dr. T. W. B. Osborn, of the University of the Witwatersrand, and Dr. J. H. S. Gear, of the South African Institute for Medical Research, Johannesburg. (*Nature,* June 22)

Man requires vitamin C in his diet because he is unable to manufacture it in his body. Monkeys and guinea pigs also must get their vitamin C rations from their diet. Men, monkeys and guinea pigs are also susceptible to both human and bovine tuberculosis.

Dogs and rats, on the other hand, are known to be able to manufacture the anti-scurvy vitamin C in their bodies. These animals and also mice are resistant to both human and bovine tuberculosis germs.

Mice may or may not be able to manufacture vitamin C in their bodies. Authorities are still in doubt on this point. There is also some question as to whether or not rabbits, pigs and cattle can make this vitamin or whether they depend on food for it.

These same animals, rabbits, pigs and calves, as well as goats, sheep and horses, stand between man and dogs in ability to resist tuberculosis germs, having resistance to the germs of the human disease but being susceptible to germs of the bovine or cattle tuberculosis.

The South African investigators believe this cannot be pure coincidence. In support of the view that there is a relationship between ability to resist tuberculosis and ability to manufacture vitamin C in the body are many reports showing that tuberculosis patients use more vitamin C than normal persons. No one knows just why this is so, but tests of the amount of vitamin C in the blood of such patients have shown it.

Patients with other infectious diseases besides tuberculosis also seem to use more vitamin C than normal. Some authorities believe that this may be because of the fever in these sicknesses which speeds up the body processes known as metabolism. This would include a speeding up of use of vitamin C.

Science News Letter, July 20, 1940

BOTANY—PHOTOGRAPHY

Plant Growth Shown Fast With Amateur Movie Outfit

DEVELOPMENT of an inexpensive electrical movie outfit which will permit amateurs to record the growth of plants on 8 mm. film, so that the growth of days and weeks can be animated on a 30-foot roll of film may lead to important discoveries in plant growth. The device, perfected by Wesley C. Casson, chemical engineer, of suburban Birmingham, Mich., permits running off the reel in two and a half minutes growth which may have covered months.

The equipment consists of an eight-millimeter motion picture camera, and an electric motor drive, controlled by a timing clock electrically driven. Individual frames can be exposed at intervals ranging from 15 minutes to two days apart, without any attention on the part of the operator. A battery of photoflood lights can be connected for continuing the sequence of pictures through the night or in overcast weather.

The entire unit is weatherproofed and may be left in position in the garden. A completed picture when screened shows

a plant springing into maturity and blossoming, as the action of days is telescoped into a few minutes. Previously, this has been done only by elaborate studio methods, but by using Mr. Casson's equipment any amateur gardener can record plant growth in his own garden.

Science News Letter, July 20, 1940

PHYSICS

Radium-Like Substances Produced Inexpensively

Patent Granted Italian Physicists Covers Bombardment by Neutrons From Cyclotron

ARTIFICIAL production of substances like radium, which can probably be produced much less expensively than the natural material, yet have the same qualities that make it useful in medicine, is covered in United States Patent 2,206,634. This has just been granted to a quintet of Italian physicists, who were at the University of Rome when application was made for the patent, October 3, 1935. They are now widely scattered.

Chief of the group is Dr. Enrico Fermi, winner of the Nobel prize in physics in 1938. At the end of that year he came to the United States to join the faculty of Columbia University, New York City. His co-patentees are Edoardo Amaldi, still in Rome; Emilio Segre, University of California, Berkeley; Franco Rasetti, Quebec, and Bruno Pontecorvo, now in South America. The patent is assigned to G. M. Giannini and Co., Inc., New York City.

Most chemical elements consist of several isotopes, which have similar properties except that they differ in atomic weight. In radium, and other substances naturally radioactive, there is a disintegration into various isotopes of other elements. This is accompanied by the emission of the alpha, beta and gamma rays, which produce the effects of radium.

In 1934 the French physicists, F. Joliot and his wife, Irene Curie-Joliot, daughter of the Curies, discoverers of radium, found that radioactivity could be started artificially. They bombarded light elements, like boron, with alpha particles from radium. After the bombardment ceased, the boron itself gave off some of the radium rays.

Later, other ways were found of producing the same effect. By bombarding with other rays or particles of high energy, isotopes of different elements can be converted into other isotopes. These may be of the same or of other elements. Some of them are so unstable that they quickly decompose. In doing so, they show radioactivity.

The first efforts were to get bombarding particles or rays with energies as high as possible, but Dr. Fermi found this desirable only when the particles were electrically charged. Then high energy was needed to break through the barrier surrounding the nucleus of the atom. With neutrons, electrically neutral particles, the greatest efficiency is obtained with low energies.

Neutrons can be produced in various ways, chiefly by the use of the cyclotron, invention of Dr. E. O. Lawrence, of the University of California, who was awarded the Nobel prize last year. These neutrons, however, have very high energy, so Dr. Fermi's problem was to slow them down, and reduce their energy.

"We have found it possible to achieve the desired results by passing the neutron radiation against or through a screen of a suitable material," states the patent. "The materials which have been found best suited to this purpose are those containing hydrogen (including all its isotopes, but the light isotope which predominates in natural occurrence being most efficient) and especially water and the hydro-carbons, such as paraffin for example."

In use, the screen may be either solid or liquid. In the latter event, the material to be treated can be dissolved or suspended in the liquid itself. The new patent covers the use of neutrons, with such an energy reducing screen and the production of radioactive isotopes thereby. Since this is so far the only satisfactory method of producing artificial radioactive substances, and these have begun to find medical use, the patent seems to be quite basic.

Sodium has been one of the most widely used elements, but many others show the effect. The patent specifications list all those that have been tried, including most of the 92 known. Platinum, gold, iodine, potassium, copper and chlorine, among others, can be made more or less radioactive. Certain elements, including hydrogen, carbon, tin, thallium, lead, bismuth and mercury, showed no activity. With these, it is supposed, the neutrons produce a change to a stable isotope.

Science News Letter, July 20, 1940

MEDICINE

Protein Migrations May Aid in Diagnosis

THE WAY protein molecules of the human body migrate in solutions under the influence of electric current may make possible a rapid and accurate diagnosis of disease.

Dr. D. A. MacInnes of the Rockefeller Institute for Medical Research, New York City, told of the new method in his lecture at Western Reserve University sponsored by the Society of the Sigma Xi, national honor fraternity for the promotion of research in science.

Df. MacInnes described the new robot "moving boundary apparatus" which makes it possible to get patterns created by normal blood plasma, and the plasma and serum patterns in different diseases.

The black and white diagnostic outlines are called schlieren patterns and consist of a series of peaks. In normal blood one peak, the largest, is caused by albumin A found in the blood plasma. Other and smaller peaks are caused by other proteins in the blood, three globulins—alpha, beta and gamma—and by the fibrinogen. The height of these peaks and their relationships to one another appear characteristic of different condi-

tions of the blood. Normal blood, for example, gives a standard schlieren pattern.

It is found in many diseases which have the common characteristic of fever —pneumonia, peritonitis, rheumatic fever and lymphatic leukemia—that in every case the peak representing alpha globulin was greatly enlarged. It may be possible that when scientists have extended the new method they will be able to "read" schlieren patterns of blood plasma as readily as a spectroscopist can look at spectrum plates and distinguish the bands and lines of molecules and atoms.

Dr. MacInnes credited the Swedish scientist Arne Tiselius with improvement in the moving boundary apparatus which has made possible the new advance. For the development of the automatic recording apparatus to obtain the schlieren patterns he praised the work of Dr. Lewis G. Longsworth of the Rockefeller Institute.

The schlieren patterns of blood are obtained by passing a beam of light through a composite solution of blood proteins. This beam, eventually, falls on a photographic plate. As an electric current is applied to the protein solutions they start to move—some faster than others—so that soon a series of boundaries between the different proteins originate. The light, shining through these boundaries, encounters materials with different refractive indices (light bending power).

By optical means these boundaries show up at the peaks of the schlieren patterns.

Science News Letter, July 20, 1940

GENERAL SCIENCE

Only by Continuous Effort Can Disorder be Prevented

British Nobelist Warns Against Optimistic Assumption Of Automatic Progress, Fashionable in Last Century

IN DAYS like these each succeeding headline reenforces the scientific rule that in any material system the most probable condition is one of chaos.

These are days when scientists in common with the rest of us look at the world critically, fearful that we are engaged in a crucial, final experiment.

Prof. A. V. Hill, Nobelist in medicine and secretary of Britain's Royal Society, in delivering the commencement address at the California Institute of Technology recently emphasized that the most certain of all scientific rules is that contained in the Second Law of Thermodynamics. In a system, once chaotic, order can be set up only by the expenditure of energy from without.

"Left to itself an ordered system gradually reverts to chaos," Prof. Hill said. "So it is in human affairs: it is only by the continual expenditure of effort that disorder can be avoided.

"For many years it was the fashion—based as little upon fact as most other fashions are—to write and speak, and finally to think and act, as though progress was inevitable. Those who doubted this creed were thought to be backward and reactionary.

"Such baseless optimism has done inestimable damage. It may have been due in part to a reaction from the hard idea of sacrifice inherent in Christiantiy. It found bogus scientific authority from the theory of evolution. The bitter fact was disregarded that, just as a house of cards carefully erected can be blown down in a second, so the decency and orderly freedom, the art and knowledge and beauty, the simple and kindly customs, which men have slowly and laboriously built up, can be quickly and easily destroyed. Such destruction was long regarded, is still regarded by many, as unthinkable.

"It is not unthinkable, it is just what is happening now to many millions of people in various parts of the world: it is what may happen everywhere if mankind goes on worshipping a false god."

Many civilizations have perished before, Prof. Hill observed, many races of animals have become extinct. Because—in pseudo-scientific jargon—of the survival of the fittest? The only evidence for that theory is that in fact they did not survive. Can we be sure that man and his present civilization are fitted to survive? or mercy, tolerance and honesty for that matter? Or may we look forward, not to extinction, but to a completely orderly arrangement like that of the ant-hill or the hive, in which freedom is impossible, spiritual things are forbidden, and unrealities like kindness, mercy and tolerance are eliminated?

Such questions may sound like bitter cynicism, Prof. Hill admitted. He continued:

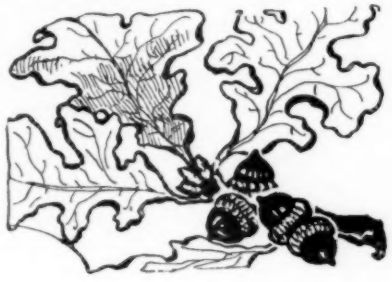
"A false god, some will say, may be better than none. Not always. False gods take people, and their unfortunate neighbours, to strange destinies sometimes, as we see in Europe and Asia today, as we may very well see in other continents before long. Why not look for an alternative to the illusion of inevitable progress which has let us down so badly? For there is one, but it is harder to accept.

"The idea of progress is a generous one: it has moved high minds and warm hearts to do many of the things worth doing: I do not say that the idea of progress is false. The mistake has been to suppose that progress is inevitable: Whereas, in fact, even what we have of decency and orderly freedom can be held only by continual effort, continual sacrifice, continual watchfulness. No system which man can create will even maintain the very moderate estate he has achieved, far less advance him beyond it, without the conscious and willing service and the coordinated effort of the majority of the people."

Science News Letter, July 20, 1940

BOTANY

NATURE RAMBLINGS
by Frank Thone



Sizes of Seeds

THERE is little relation between the size of seeds and the size of plants that grow from them.

True, oaks are big trees that grow from big seeds. The same holds for walnuts. But elms are just as big and they grow from little seeds. Cottonwoods are even bigger and they grow from seeds as small as the "grain of mustard seed" famed in Biblical parable.

The same disparity holds among conifers. Probably the largest conifer seeds are the pine seeds sold as pinyon nuts. The trees that bear them are usually stunted, gnarled things 15 or 20 feet high—at most 40 or 50 feet. On the other hand, the California Big Trees and coast redwoods, most massive and tallest of all things that grow, have rather ordinary-sized seeds. Redwood seeds are only about a sixteenth of an inch long, Big Tree seeds about twice that size.

Coconuts are seeds, and they are almost the largest of seeds. Largest of known seeds are fairly closely related to them, the twin coconuts that grow in the Seychelles Islands, in the Indian Ocean. They always come in pairs, and they are about as big as footballs.

There are plenty of seeds that are smaller than the mustard seed of the parable, although this seed really is small—probably about the smallest seed with which the hearers of Jesus were familiar. Incidentally, if the statement that a "great tree" with birds nesting in the branches grows from this seed seems a trifle exaggerated to dwellers in the eastern states, Californians can reassure them. A wild mustard thicket in California can be really respectable jungle.

Smaller than mustard seed, however, are the seeds of such plant groups as the orchids, many members of the nightshade family (potato, petunia and tobacco, for instance) poppies, portulacas and pinks.

Seeds of the mistletoe are so small and so well hidden by the sticky flesh of the berries that the Druids, to whom the plant was sacred, thought that it had no seeds at all, and considered its propagation to be supernatural.

Science News Letter, July 20, 1940

GENERAL SCIENCE

Defense Requires Knowledge, Organized and Implemented

PRIMARILY we need proved weapons, men, planes and ships to make America safe from attack by military forces.

We need good will, good propaganda, intercontinental understanding and effective economic measures to knit our peoples, both of the United States and our neighbor American nations, into a self-contained, determined and democratically-controlled whole, safe against ideological and material invasion.

Back of these defense lines lies knowledge, organized and implemented by the searchings of human minds and hands.

Knowledge properly applied through research by competent individuals brings forth strength in times like these.

Science's genius and sweat is being directed toward new mechanisms and devices of warfare by the newly created National Defense Research Committee, upon which sit together military men and scientists. This mobilization of science for our military protection may very well bring forth new and decisive weapons, if there is time to achieve results before actual war comes.

Coincident with the direct and practical application of science to immediate problems, there is a determination to keep active those long-time "theoretical" searches that are often the most productive. The possibility of atomic power from within the uranium atom arose out of atomic physics experiments. If feverishly-working investigators translate this possibility into reality, we may have a powerful new means of defense.

Backing up the active laboratories and the mapping out of research possibilities are the storehouses of information, the books and journals of our scientific libraries. Now as never before the scientist and engineer needs to use the accumulated knowledge and facts and use them fast.

Fortunately there has been developed during the past decade a method of delivering to the desk or laboratory table of any scientist anything that is written or pictured. Little strips of what appear to be motion picture film, called microfilm, putting the page of a book or a journal into the space of about an inch square, serve as the means of multiplying as needed the precious research information wherever it may be. They are easily read by optical enlargement. Special cameras are installed in leading libraries to render this service speedily and cheaply.

If for this emergency and for the future these microfilm services can be federated into a nation-wide intelligence service, research for defense as well as for better living will have a powerful ally.

Science News Letter, July 20, 1940

First Glances at New Books

ECONOMICS

OPPORTUNITIES IN GOVERNMENT EMPLOYMENT — L. J. O'Rourke — *Garden City Pub. Co.*, 307 p., illus., $1. If the defense program should initiate a march on Washington of employment seekers, this book by the director of research in the U. S. Civil Service Commission should be useful as a guidebook. Most of Uncle Sam's nieces and nephews will probably be surprised at the wide variety of jobs in Government Service.

Science News Letter, July 20, 1940

SOCIOLOGY

MIGRATION AND SOCIAL WELFARE — Philip E. Ryan—*Russell Sage Foundation*, 114 p., 50c. Discussion of an important problem.

Science News Letter, July 20, 1940

TELEVISION

WE PRESENT TELEVISION—John Porterfield and Kay Reynolds, eds.—*Norton*, 298 p., $3. Twelve different authorities contribute chapters dealing with such phases of television as its technique, the director, the actor, the new newsreel, the finance problem and problems of programming. Evidently it is not intended to be a reference work, since no index is provided.

Science News Letter, July 20, 1940

ENGINEERING

DIESEL MONITOR—Julius Rosbloom—*Diesel Engineering Inst.*, 528 p., illus., $5. Written throughout in the form of questions and answers, it seems as if any practical problem concerned with Diesel engine operation is answered in this book.

Science News Letter, July 20, 1940

CHEMISTRY

ELEMENTARY LABORATORY EXPERIMENTS IN ORGANIC CHEMISTRY (3d. ed)— Roger Adams and John R. Johnson—*Macmillan*, 420 p., $2. This, the latest edition of a well-known text, now includes experiments previously confined to advanced study. This has been done on account of the rapid progress of synthetic organic chemistry in the preparation of polymers which have important industrial applications.

Science News Letter, July 20, 1940

CHEMISTRY

FUNDAMENTALS OF SEMIMICRO QUALITATIVE ANALYSIS—Erwin B. Kelsey and Harold G. Dietrich—*Macmillan*, 350 p., $2.75. Having become, as they state, convinced of the value of teaching qualitative analysis by working with samples of the order of a milliliter or less, the authors have prepared this text which approaches the subject on that basis.

Science News Letter, July 20, 1940

ENGINEERING

HIGHWAY RESEARCH BOARD: PROCEEDINGS OF THE NINETEENTH ANNUAL MEETING—Roy W. Crum, ed.—*National Research Council*, 578 p., $2.25. Here are published the papers presented at the meeting in Washington, D. C., in December, 1939. They cover many phases of highway engineering—materials, maintenance, traffic and safety, design, economics and finance.

Science News Letter, July 20, 1940

MATHEMATICS

A BRIEF COURSE IN TRIGONOMETRY—David Raymond Curtiss and Elton James Moulton—*Heath*, 135 p., $1.50. Recognizing the tendency among mathematics teachers to give a general course in "mathematical analysis," but feeling that it is preferable to retain the customary divisions, the authors have written this book especially so that while covering this division the larger field may be kept in mind.

Science News Letter, July 20, 1940

ANTHROPOLOGY

THE SOCIAL ORGANIZATION OF THE HAISLA OF BRITISH COLUMBIA—Ronald L. Olson—*Univ. of Calif. Press*, 31 p., 35c. (Anthropological Records, vol. 2, no. 5.)

Science News Letter, July 20, 1940

ANTHROPOLOGY

CULTURE ELEMENT DISTRIBUTIONS: XII, APACHE-PUEBLO—E. W. Gifford—*Univ. of Calif. Press*, 207 p., $2. (Anthropological Records, vol. 4, no. 1.)

Science News Letter, July 20, 1940

GENERAL SCIENCE

THE AMERICANA ANNUAL, An Encyclopedia of Current Events, 1940—A. H. McDannald and J. B. McDonnell, eds.—*Americana Corp.* 862 p., $10. An authoritative yearbook which conveniently surveys the events of 1939, including many fields of science.

Science News Letter, July 20, 1940

ANATOMY—PHYSIOLOGY

BUNDY'S ANATOMY AND PHYSIOLOGY (7th. ed.)—S. Dana Weeder, ed.—*Blakiston*, 490 p., illus., $2.75. Much new material has been added to bring this text up to date.

Science News Letter, July 20, 1940

PHYSICS

NEW THEORIES IN PHYSICS; Conference Organized in Collaboration with The International Union of Physics and The Polish Intellectual Co-operation Committee, Warsaw, May 30th-June 3rd., 1938—*Columbia Univ. Press*, 247 p., $2. Sir Arthur Eddington, Niels Bohr, Charles Fabry, L. de Broglie and other distinguished physicists contributed to this meeting, held when Poland was a happier place than now.

Science News Letter, July 20, 1940

GENERAL SCIENCE

1940 BRITANNICA BOOK OF THE YEAR —Walter Yust, ed.—*Encyclopaedia Britannica*, 748 p., illus., $10. Essential supplementary volume for the reference shelves to record the events of 1939. Lavishly illustrated, there are 1141 articles by 521 authorities.

Science News Letter, July 20, 1940

MEDICINE

TREATMENT OF WAR WOUNDS AND FRACTURES—J. Trueta—*Hoeber*, 146 p., $2.50. See page 40.

Science News Letter, July 20, 1940

GENERAL SCIENCE

SCIENCE FRONT, 1939—F. Sherwood Taylor—*Macmillan*, 301 p., $2.50. Competent accounts of progress in many science fields, presented under the chapter headings: Science and Plant Growth, Progress in Chemotherapy, Sex and the Steroids, The Stuff of Life, The War against Cancer, The Shock Treatment of Schizophrenia, The Making of Oil from Coal, Progress in Television, A Crazy Liquid, Inside the Atom, The New Quartz Clock, The Polar Aurora, and Our View of the Universe.

Science News Letter, July 20, 1940

GENERAL SCIENCE

THE WORLD BOOK ENCYCLOPEDIA ANNUAL FOR 1939, A Review of the Events of the Year—S. Edgar Farquhar—*Quarrie Corporation*, 176 p., $1. Concise and authentic chronicle of an eventful year, supplementing a popular encyclopedia.

Science News Letter, July 20, 1940

MEDICINE

DYNAMICS OF INFLAMMATION, An Inquiry into the Mechanism of Infectious Processes — Valy Menkin — *Macmillan*, 244 p., illus., $4.50. A technical book that will be interesting to medical scientists.

Science News Letter, July 20, 1940